and results, a definite outline of the essentials which must be taught concerning a given subject, and a definite time allotment necessary for the proper handling of that subject, can in time be reached. It may seem of small importance in the beginning whether a subject is taught in a series of six lectures, or in a series of classes accompanied by demonstrations occupying an hour twice weekly for six weeks; but three years hence it will make all the difference between a nurse who knows that subject and one who does not.

To go further into detail concerning any of the subjects mentioned would be to transgress still further the time limit set for this paper. I have not found myself able to adhere closely to the subject about which your executive did me the honor to ask me to write. I can only suggest some ways by which it seems to me our present methods may be improved and developed, may be steadied and strengthened. If we call what we are doing educating nurses, let us really educate; let us make our professional training as liberal as possible, and not merely technical. Let us do this for the honor and dignity and usefulness of our profession, and for the furtherance of any service which the community has a right to expect from us.

I would urge forward every effort to give better and better teaching in our training-schools, and every attempt to test our competency for our profession.

[The discussion which followed Miss Nutting's paper will be given in the next number.—Ed.]

SURGICAL ANÆSTHESIA *

By ALBERT H. MILLER, M.D.
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The object of anæsthesia is to do away with the suffering which formerly attended surgical operations. Incidentally many lives have been saved by lessening the shock to the nervous system and by making possible many operations which could not possibly have been done without the aid of an anæsthetic.

As far back as we can trace the history of medicine efforts have been made to lessen the pain of surgical operations. The ancient Egyptians, Assyrians, and Chinese experimented with drugs producing anodyne effects. The Greeks and Romans seem to have had some success in producing artificial sleep by an infusion of the mandrake in wine. Messer,

* A lecture to the Rhode Island Hospital Nurses

in the eighteenth century, by the aid of hypnotism, enabled patients to undergo painful surgical operations without suffering.

True anæsthesia was not produced until the middle of the nineteenth century. In 1844 a dentist of Hartford, Conn., named Wells, succeeded in producing anæsthesia for dental operations by nitrous oxide gas. Attempting to demonstrate his method at the Massachusetts General Hospital, he entirely failed because of ignorance of the principles underlying his discovery. He was so disappointed that he gave up his experiments, became insane, and died by his own hand. His partner, whose name was Morton, experimented with ether, and on October 17, 1846, successfully anæsthetized a patient at the Massachusetts General Hospital. Morton named his discovery lethon, and endeavored to keep it secret, but the characteristic odor of ether was soon recognized. Simpson, the Edinburgh surgeon, first used chloroform in 1847. Oliver Wendell Holmes suggested the name anæsthesia. It is defined as a condition characterized by abolition of sensation.

By the aid of the circulation a general anæsthetic produces its physiological effect upon the central nervous system. An anæsthetic may be administered by the stomach or rectum or by inhalation. The advantage of administration by inhalation lies in the possibility of perfect control over the amount given and because the respiratory mucous membrane is less irritated by the anæsthetic than is the mucous membrane of the stomach or rectum.

Primarily the action of respiration is like that of a bellows, which alternately draws air in and forces it out. The purpose of this action of the lungs is to bring a constant supply of fresh air in as close contact as possible with the blood. From this fresh air the blood obtains oxygen and gives up in return carbon dioxide. The oxygen thus obtained is carried by the red blood-cells to every part of the body. So necessary is this supply of oxygen that if the supply of fresh air is entirely cut off for two minutes death occurs. If the air supply is partly cut off, the breathing becomes labored, the pulse falls, the color becomes cyanotic, and the patient may become unconscious from asphyxiation.

In using the respiratory channel for the entrance of an anæsthetic we must take care not to interfere with the normal respiratory action and only to add to the inspired air an amount of the vapor of the anæsthetic sufficient for our purpose. This vapor will be absorbed by the blood from the air in the lungs and carried by the circulation to the central nervous centres, where it will produce the condition of unconsciousness necessary for the operation. When the anæsthetic is no longer administered, the vapor passes back from the blood into the air to be expired, and the quantity of anæsthetic in the blood affecting the brain is thus reduced until the anæsthetic effect passes away.

In the consideration of anæsthetics the question of safety is of first importance. It may be said that in general it would be better that a patient should continue to suffer from his disease or, unaided, endure the pain of operation than that he should be killed by ignorant or careless administration of a drug. To pour an anæsthetic in a cone and to hold it over a patient's face until he ceases to struggle is a simple procedure. To properly anæsthetize and carry him through an operation is a task often more difficult than the operation itself.

Of the three general anæsthetics in common use, nitrous oxide, with a mortality of one in five million, is the safest. The time required to administer it is one minute, and the time available for operation is only a half minute. Its principal usefulness is for short operations. It is extensively used for dental operations and to precede the administration of ether. The nitrous oxide ether sequence is at present the most perfect method of anæsthesia known. It requires special apparatus and the skill gained by considerable experience for its successful administration.

Ether is obtained by distilling alcohol with sulphuric acid. It is a transparent, colorless, volatile liquid, having a characteristic, penetrating odor. It is very inflammable. When exposed to air, it quickly evaporates, the vapor also being inflammable. As the vapor is heavier than air, accidents may be avoided by keeping any open flame at a level higher than the supply of ether. The vapor, when inhaled in concentrated form, causes considerable irritation of the respiratory mucous membrane and a feeling of suffocation. The death rate from ether is given as one in sixteen thousand.

Chloroform is obtained by distilling alcohol with chlorinated lime. It is a heavy, colorless liquid, evaporating readily and having a characteristic, sweet odor. Its vapor is less irritating than that of ether. It is not inflammable, but in the presence of an open flame it is decomposed with the production of chlorine gas, which causes great respiratory irritation when inhaled. With a mortality of one in one thousand, it must be considered a dangerous drug. You will probably not be called on to administer chloroform except in obstetrical cases. In these cases it is given in small amounts and not to the stage of complete anæsthesia. There is little danger in such use.

Except in emergency cases which do not allow time to be thus consumed, a patient before undergoing general anæsthesia should have careful preparation. The kidneys, heart, and lungs should be examined, that any fault in these organs may be recognized and consequent accident guarded against. No solid food or milk should be allowed for six hours previous to the operation. The stomach and intestines should be empty, that the danger of food vomited being drawn into the air-passages may

be avoided, that the nausea and vomiting may be lessened, and that these organs shall be required to do as little work as possible when in the depressed condition following anæsthesia and operation.

Immediately before the anæsthetic is given, the bladder should be emptied, that it may not be injured or otherwise interfere with an operation, and that unnecessary distention following the operation may be avoided. The clothing about the neck and chest should be loosened, that the respiratory movements may not be hampered. Female patients should be provided with a head cap to prevent soiling the hair. The patient should be in the horizontal position, as this is most favorable to the action of the heart. There should be no chewing-gum, false teeth, or other foreign body in the mouth to be swallowed or inspired.

Before commencing the administration, the anæsthetist should have at hand: the anæsthetic and apparatus for its administration, a tongue forceps and mouth gag, a needle and suture suitable to pass through the tip of the tongue to draw that organ forward, a hypodermic syringe with strychnine, digatalin, nitroglycerine and atropine, saline solution and apparatus for its subcutaneous use, and a watch with a second-hand for noting the rapidity of the pulse and respiration.

(To be continued.)

BELLEVUE HOSPITAL, PAST AND PRESENT

By GEORGIANA F. POPE
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Who remembers Bellevue twenty years ago? To the uninitiated it was simply the large City Hospital of nine hundred beds lying at the foot of East Twenty-sixth Street, but for those who knew something of its internal life and were possessed both of feeling and a sense of humor, what a never-ending study of human life in all its phases! Let us go back to it in the guise of a timid probationer in nursing who has come with the highest of motives, combined with the most impractical and sentimental ideas, to devote her life to caring for the sick. She is young and has never been from home before. She has visions of bathing aching brows with cologne, smoothing pillows, placing a rose in the fevered hand of a patient, etc.; and so she goes on duty the first day in Bellevue in ward —. There is no elevator, except for the stretcher cases, and on the way to the top floor she meets the scrub-gang. This body is made up of the arrivals of yesterday's "Black Maria," the probationer is told, and